

Legionellosis

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Section 1

ABOUT THE DISEASE

A. Etiologic Agent

Legionellosis is an acute bacterial disease caused by *Legionella* species, with *Legionella pneumophila* being the most common. Numerous serogroups are implicated in human disease, although *L. pneumophila* serogroup 1 is most commonly associated with disease in humans.

B. Clinical Description

Legionellosis has two distinct forms: Legionnaires' disease, which is more severe, and Pontiac fever, which is milder. The most common initial symptoms of Legionnaires' disease and Pontiac fever are anorexia, myalgia, malaise, and headache. These symptoms are followed by fever (up to 102 – 105° F), chills, and a non-productive cough. Other symptoms may include abdominal pain and diarrhea. Legionnaires' disease is primarily associated with pneumonia. The overall case-fatality rate is 5–30%. Pontiac fever is not usually associated with pneumonia or death, and cases usually recover in 2–5 days without treatment. Legionnaires' disease usually cannot be distinguished from other forms of pneumonia and requires specific tests to confirm the diagnosis.

C. Vectors and Reservoirs

Legionella is commonly found in the environment. Organisms have been identified in many different kinds of water and water systems, such as hot and cold tap water, in showers, creeks, ponds, whirlpool spas, cooling towers, and evaporative condensers of large air-conditioning systems. Outbreaks of legionellosis have been linked to these sources, as well as to decorative fountains, humidifiers, respiratory therapy devices and misters (such as those found in the produce section of grocery stores). The bacteria are most likely to reproduce in high numbers in warm, stagnant water. In this environment, they live as intracellular parasites of free-living amoebae.

D. Modes of Transmission

Legionellosis is transmitted via the airborne route when aerosols are inhaled from a water source contaminated with the bacteria, or through aspiration. Legionellosis is not known to be transmitted from person to person. There is no evidence to suggest transmission of *Legionella* from auto air-conditioners or household window air-conditioning units, which do not use water as their coolant.

E. Incubation Period

The incubation period for Legionnaires' disease ranges from 2–10 days, but is most commonly 5–6 days. The incubation period for Pontiac fever ranges from 5–66 hours, but is most commonly 24–48 hours.

F. Period of Communicability or Infectious Period

Legionellosis is not communicable from person to person.

G. Epidemiology

Legionnaires' disease was named after an outbreak that occurred among people attending a convention of the American Legion in Philadelphia in 1976. Legionellosis has a worldwide distribution. An estimated 8,000–18,000 people develop Legionnaires' disease in the U.S. each year. Most of these are single, isolated cases that are not associated with an outbreak. Outbreaks usually occur in the summer and fall, though cases can occur year-round. Serologic surveys have shown a prevalence of antibodies to *L. pneumophila* serogroup 1 at a titer of $\geq 1:128$ in 1–20% of the population. Illness most severely affects older persons, especially those who smoke cigarettes or have chronic lung disease. Other risk factors include immunosuppressive therapy and immunosuppressive diseases such as HIV/AIDS and diabetes. *Legionella* is estimated to be responsible for 0.5–5% of cases of community-acquired pneumonia.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.

Section 2

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report the following:

- Isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, blood, or other normally sterile fluid.
- The detection of *L. pneumophila* serogroup 1 antigens in urine.
- The detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, immunohistochemistry (IHC), or other similar method.
- A four-fold or greater rise in antibody titer to specific species or serogroups of *Legionella*, including *L. pneumophila* serogroup 1.
- The detection of *Legionella* species by a validated nucleic acid assay.

Note: See Section 3B for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH William A. Hinton State Laboratory Institute (HSLI) can perform cultures for *Legionella* species on clinical specimens other than serum or urine. For more information about *Legionella* cultures, call the HSLI Reference Laboratory at (617) 983-6607.

Section 3

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify sources of exposure (e.g., contaminated water source), and to stop transmission from such a source.

B. Laboratory and Health Care Provider Reporting Requirements

Health care providers who identify a case of legionellosis, as defined by the reporting criteria in Section 2A, should report it to the LBOH in the community where the case is diagnosed.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Legionella* infection, as defined by the reporting criteria in Section 2A, shall report such evidence of infection directly to the MDPH *through secure electronic laboratory reporting mechanisms*, or other method, as defined by the Department, within 24 hours. MDPH will then notify the appropriate LBOH as described in Section 3C below.

NOTE: A single positive antibody titer to a specific species or serogroup of *Legionella* does not meet the reporting criteria outlined in Section 2A. Therefore, if a laboratory reports a single positive antibody titer to MDPH, the result will not be forwarded to the LBOH until a second titer is received (indicating a four-fold rise) OR another type of reportable laboratory test is received (culture, urine antigen, DFA, PCR) at which point the event will show up in the “Online LBOH Notification for Routine Disease” workflow as described in Section 3C below.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that legionellosis is reportable to the LBOH and that each LBOH must report any confirmed case of legionellosis or suspect case of legionellosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Infectious Disease, Office of Integrated Surveillance and Informatics Services (ISIS) via MAVEN. Refer to the List of Diseases Reportable to Local Boards of Health for information on prioritization and timeliness requirements of reporting and case investigation <http://www.mass.gov/eohhs/docs/dph/cdc/reporting/rprtbdiseases-lboh.pdf>.

Case Investigation

It is the responsibility of the LBOH to complete all questions in each of the question packages by interviewing the case and others who may be able to provide information. Much of the clinical information required can be obtained from the health care provider or from the medical record. Important details relevant to legionellosis exposure, control and prevention need to be obtained from the case or his/her family members.

Calling the provider

If the case was hospitalized (i.e. reporting facility is a hospital), call infection control at the named hospital. A list of infection preventionists can be found in the help section of MAVEN. If the case was seen at a clinician’s office, ask to speak to a nurse working with the ordering provider.

Calling the case or parent/guardian of the case

Before calling the case, review the disease fact sheet by clicking on the Help Button located in MAVEN and/or reviewing this entire chapter. The call may take a few minutes, so in order to maximize the

chance of getting the information needed, it might be good to note the potential length of the call with your contact, and offer the opportunity to call back when it is more convenient. Asking questions about how the case or child is feeling may get the case or parent talking. If you are unable to answer a question they have, don't hesitate to call the Division of Epidemiology and Immunization at 617-983-6800 for assistance, and call the case back with the answer later. People are often more than willing to talk about their illness, and they may be very happy to speak with someone who can answer their questions.

Using MAVEN

Administrative Question Package

Monitor your "Online LBOH Notification for Routine disease" workflow in MAVEN for any new cases of legionellosis. Once a new event appears in this workflow, open the Administrative Question Package (QP) and under the "Local Health and Investigation" section, answer the first question "**Step 1** - LBOH acknowledged" by selecting "Yes". The "LBOH acknowledged date" will then auto populate to the current day. Completing this first step will move the event out of this workflow and into your "Online LBOH notified but Case Report Forms (CRF) are pending" workflow. Note the date you started your investigation by answering "**Step 2** - Investigation started" as "Yes" and then note the date where shown. Record your name, agency, and phone numbers where shown in "**Step 3** - LBOH/Agency Investigator."

Demographic Question Package

Record all demographic and employment information. It is particularly important to complete the Race/Ethnicity and Occupation questions.

Clinical Question Package

Complete the "Diagnosis/Clinical Information" section, providing the diagnosis date, symptom information and date of symptom onset and other medical information. Accurate symptom information is necessary to distinguish cases of Legionnaires' disease from Pontiac fever (e.g., x-ray diagnosed pneumonia indicates Legionnaires' disease).

In the "Hospitalization/Clinician/PCP Information" section, note whether the case was hospitalized and if "Yes" record the date hospitalized, date discharged and medical record number. You can select the name of the hospital by clicking on the magnifying glass to the right of the question. Accurate information regarding hospitalization is important to determine whether the case is nosocomially-acquired. Nosocomially-acquired legionellosis cases may require additional follow-up as described in Section 4.

Risk Exposure/Control & Prevention Question Package

The incubation period for legionellosis can be as long as 10 days; therefore, when you are answering the questions in this section focus on the 10 days prior to the case becoming ill. Determine if the case spent any nights away from home, including travel out of the state or out of the country. Please record their departure date(s), arrival date(s), hotel(s) names and addresses or other accommodation information. It is important to get as many details as possible, as these cases get reported to the Centers for Disease Control and Prevention to help identify travel-associated outbreaks. Ask the patient if they spent time in or near a whirlpool spa or hot tub, and provide those details in the space provided.

In addition, it is important to ask the patient if they used a nebulizer, CPAP, BiPAP or other respiratory equipment in the 10 days prior to their onset of symptoms. If they did, please indicate whether the device used a humidifier and if so, what type of water was used in the device.

The next series of questions are relevant to patients who visited or stayed in any healthcare setting, such as a hospital, long term care facility, rehabilitation or skilled nursing facility. Record the arrival and departure dates, the name and address of the facility, the type of setting, the type of exposure, and reason for visit.

If a patient lives or visited an assisted living facility or senior living center, please provide this information in the next table. Include visit dates, facility type, facility name, and address. Indicate the type of exposure, such as whether the patient is a resident, visitor, volunteer, or employee of the facility.

Other information

Any additional information on the case you would like recorded in MAVEN can be included in the “Notes” section which is located to the right of the Event Summary on the dashboard; however, do not include any information in the Notes section which can already be captured in a QP (i.e., hotel accommodation details).

Completing Your Investigation

1. If you were able to complete a case investigation and follow-up is complete, mark “**Step 4 – Case Report Form Completed**” as “Yes” and then choose Local Board of Health (LBOH) –Ready for MDPH review for the Completed by variable.
2. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please complete “**Step 4 - Case Report Form Completed**” as “No” and then choose a primary reason why the case investigation was not completed from the choices provided in the primary reason answer variable list.
3. If you are not online for MAVEN you may submit a paper case report form. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked “Confidential”) to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to obtain a copy of the case report form and to confirm receipt of your fax.

The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

Section 4

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

None

B. Protection of Contacts of a Case

None

C. Managing Special Situations

Response to a Single Case of Community-Acquired Legionellosis

One case of legionellosis does not require any further investigation, other than entering all appropriate case information into MAVEN as described in Section 3C. Individuals with sporadic legionellosis typically report that they must have gotten the infection from a particular place, such as a worksite or place of worship or recreation. Since *Legionella* can be found in a wide variety of water sources at low levels, unless another case occurs that also implicates the reported “source,” it is difficult to prove if a particular source was the cause of illness. Alleged sources need not be tested or decontaminated based on one community-acquired case.

Response to Healthcare-Associated Legionellosis

A laboratory-confirmed case of legionellosis that occurs in a patient who has been hospitalized continuously for ≥ 10 days before the onset of illness is considered a case of healthcare-associated legionellosis. When a case of healthcare-associated legionellosis occurs in a hospital or long-term care facility, surveillance efforts for additional cases should be enhanced by the infection control official at the facility. If more cases are identified, measures should be taken to identify the source and to eliminate the contamination. See Section 4D for more information. For detailed recommendations for responding to healthcare-associated legionellosis, refer to *Guidelines for Preventing Health-Care-Associated Pneumonia, 2003* (<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm>); as well as *Guidelines for Environmental Infection Control in Health-Care Facilities* (<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>).

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of legionellosis in your city/town is higher than usual or if you suspect an outbreak, investigate clustered cases in an area or institution to determine the source of infection. A source of infection could be a cooling tower, decorative fountain, whirlpool spa, grocery store mister, etc. If evidence indicates a common source, applicable preventive or control measures should be instituted. Testing water sources is a specialized procedure and will require the assistance of environmental professionals. Guidelines from the CDC can be found here: <http://www.cdc.gov/legionella/index.htm>.

A confirmed source should be cleaned and decontaminated according to established protocols, and a schedule of continued testing must be put in place for a period of time that will be determined on a case-by-case basis. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, for assistance in investigating, testing, and implementing control measures. The Division can also perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

D. Preventive Measures

To avoid future exposures:

- Cooling towers should be drained when not in use, and they should be mechanically cleaned and maintained according to the manufacturer’s recommendations.
- Tap water should not be used in respiratory therapy devices.

- Hotels, cruise ships, and other owners of whirlpool spas and decorative fountains should maintain them according to the manufacturer's recommendations, and they should stay up-to-date on protocols for public health safety.
- After outbreaks, vigilant monitoring of proven sources should be maintained.

A Legionellosis Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at

<http://www.mass.gov/eohhs/gov/departments/dph/programs/epidemiology.html>

Click on "Fact Sheets".

Section 5

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for legionellosis is the same as the criteria outlined in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at

<http://wwwn.cdc.gov/nndss/script/casedefDefault.aspx>

REFERENCES

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